

**REMARKS**

**I. Introduction**

Claims 1-25 have been examined. Claims 1-25 have been rejected under 35 U.S.C. § 103(a). Claims 13-18 are also rejected under 35 U.S.C. § 112, second paragraph.

**II. Rejection of claims 1-25 under 35 U.S.C. § 103(a)**

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hara et al., U.S. Patent No. 6,312,115 (hereinafter “Hara”) in view of Hayakawa et al., Japanese Patent No. 404135862 (hereinafter “Hayakawa”).

Applicants note that to establish a prima facie case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See* MPEP § 2143.

Furthermore, as the Federal Circuit just recently reminded us, the USPTO is held to a *rigorous* standard when trying to show that an invention would have been obvious in view of the combination of two or more references. *See, In re Sang Su Lee*, 2002 U.S. App. LEXIS 855, \*10 (Fed. Cir. 2002), *citing, e.g., In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.”).

The Federal Circuit goes on to emphasize that the “need for specificity pervades this authority.” *In re Sang Su Lee* at \*10-\*11 (emphasis added) (*citing In re Kotzab*, 217 F.3d 1365,

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1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"))).

Applicants respectfully submit that the current grounds of rejection do not satisfy the Federal Circuit's *rigorous* standard for demonstrating that the claimed invention would have been obvious in view of the combination of Hara in view of Hayakawa.

Specifically, while the Examiner states that Hara discloses various elements of the claimed invention, the Examiner acknowledges that Hara fails to teach or suggest a piezoelectric device for detecting a consumption condition of the liquid. The Examiner then states that Hayakawa teaches (in figure 1) an ink cartridge comprising a flexible piezoelectric sheet for detecting a remaining quality of an ink passing chamber. Therefore, the Examiner applies the combination of Hara in view of Hayakawa in rejecting claims 1-25 under § 103(a).

The Examiner asserts that "it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the piezoelectric device taught by Hayakawa in the ink container of Hara for the purpose of detecting remaining ink without fail." This conclusory statement does not appear to satisfy the aforementioned *rigorous* standard required by the Federal Circuit.

Indeed, there does not appear to be any suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. For example, Hara discloses an ink tank cartridge which is convenient to manufacture, assemble, store and connect, and which helps prevent the formation of bubbles in the ink. *See, e.g.*, col. 1, line 66 to col. 2, line 2. However,

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no suggestion or motivation was indicated by the Examiner for modifying the relatively simple ink cartridge of Hara (*see, e.g.*, Fig. 22) to accommodate the complex structure disclosed in Hayakawa (*see, e.g.*, Fig. 3 -- illustrating a connecting member which connects an ink cartridge to a head module, as shown in Fig. 1), to achieve the capability of being able to precisely detect the consumption condition of a liquid in the liquid container, as in the claimed invention.

Indeed, the Examiner's conclusory statement that it would have been obvious to incorporate the teachings of Hayakawa and Hara for the purpose of detecting remaining ink without fail suggests just the type of impermissible hindsight analysis that led the Federal Circuit to re-emphasize the need for "rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." *See, In re Sang Su Lee*, 2002 U.S. App. LEXIS 855, \*10 (Fed. Cir. 2002), *citing, e.g., In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

For at least the above reasons, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness by demonstrating some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.

However, even assuming *ad arguendo* that a valid suggestion or motivation exists for combining the references, the combination of Hara in view of Hayakawa still fails to teach or suggest the various features of the claimed invention. For example and not by way of limitation, while Hayakawa discloses a device (including a flexible piezoelectric sheet 11) for detecting a residual amount of ink in an ink-jet printer, the piezoelectric sheet is disposed on a connecting member (*see, e.g.*, Fig. 3), which connects an ink cartridge 1 to a head module 3, and is not

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disposed on the ink cartridge 1. Independent claim 1 is representative of the rejected claims and recites a **liquid container being provided with a piezo-electric device for detecting a consumption condition of said liquid in said liquid container**. Therefore, the combination fails to teach or suggest any constitution in which a liquid container itself is provided with a piezoelectric device for detecting a consumption condition in the liquid container, as recited in claim 1.

For at least the above reasons, Applicants traverse the rejections of claims 1-25.

**III. Rejection of claims 13-18 under 35 U.S.C. § 112, second paragraph**

Claims 13-18 have been rejected under 35 U.S.C. § 112, second paragraph as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

*A. Claims 13 and 16*

The Examiner states that it is unclear what “lyophobic part” is and how it is read on the preferred embodiment or can be determined on the drawings, and the Examiner requests appropriate correction or clarification. Claims 13 and 16 recite the same limitation of **wherein said liquid container has a lyophobic part therein which is lyophobic to said liquid in said liquid container**. Applicants submit that both the ordinary meaning of lyophobic and Applicants' thorough discussion of the use of a lyophobic part or parts in the claimed invention satisfy the requirement of § 112, second paragraph in sufficiently pointing out and distinctly claiming the subject matter of the claimed invention. Accordingly, the rejections of claims 13 and 16 are traversed. In the interests of expediting prosecution, however, Applicants respectfully

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invite the Examiner to carefully review Applicants' discussion of an illustrative, non-limiting use of a lyophobic part or parts at, by way of example, page 36, line 21 to page 43, line 21.

### *B. Claim 14*

Applicants have amended claim 14 to rewrite the steps of **reducing a pressure in said container body to a pressure lower than an atmospheric pressure and charging said container body with said liquid** as functional limitations of the claimed liquid container. By this amendment, the Examiner's rejection of claim 14 is traversed.

### *C. Claims 15, 17, and 18*

The rejections of claims 15, 17, and 18 are traversed at least by virtue of their dependency.

## IV. New claims 26-37

New claims 26-37 have been added to provide a more varied scope of coverage.

## V. Formal Matters

### *A. Priority Documents*

Applicants thank the Examiner for acknowledging Applicants' claim for foreign priority under 35 U.S.C. § 119, including receipt of all priority documents filed on June 15, 2001.

### *B. Drawings*

Applicants submit herewith a Proposed Drawing Correction for figure 12, wherein element 105 has been marked for removal with red ink.

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*C. Specification*

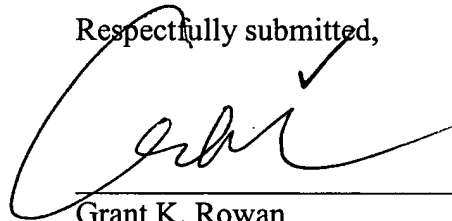
Applicants have amended the specification to correct various typographical errors.

**VI. Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Grant K. Rowan', is written over a horizontal line.

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**APPENDIX** ✓  
**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

**The specification is changed as follows:**

**Please amend the third full paragraph on page 20 as follows:**

To charge the ink cartridge 180 with ink, the air inlet 185 is closed first and an air suction tube 28 connected to the vacuum ~~pump 10~~ pump 16 is connected to the ink feed port 187 of the ink cartridge 180. A hollow needle is installed at the end of the air suction tube 28 and pierced into the ink feed port 187, thus the air suction tube 28 may be connected to the ink cartridge 180.

**Please amend the paragraph that runs from page 22, line 32 to page 23, line 7 as follows:**

Fig. 8 shows the procedure of ink charging using the ink charging device 22 shown in Fig. 6. Firstly, the air inlet 185 is closed (S26) and the air suction tube 28 connected to the vacuum ~~pump 10~~ pump 16 is connected to the ink feed port 187 of the ink cartridge 180 (S27). Next, the vacuum pump 16 is driven and air is sucked and removed from the ink cartridge 180 so as to decompress it (S28). Next, the ink feed port 187 is closed (S30), and the ink feed tube 26 connected to the ink tank 18 is connected to the air inlet 185 of the ink cartridge 180 (S31), and ink is fed from the ink tank 18 to the ink cartridge 180 (S32). When the ink charging into the ink cartridge 180 is finished, the air inlet 185 and the ink feed port 187 are closed (S34) and the ink charging procedure is finished.

**Please amend the paragraph that runs from page 25, line 36 to page 26, line 12 as follows:**

An ink cartridge 180H of Fig. 9B has one partition wall 212 extending from the upper surface 194c of the ink container 194 to the lower portion. Since the predetermined interval is spaced between the lower end of the partition wall 212 and the bottom surface of the ink container 194, the bottom portion of the ink container 194 is communicated. The ink cartridge 180H has two containing chambers 213a and ~~312b~~-213b divided by the partition wall 212. The bottom portions of the containing chambers 213a and ~~313b~~-213b are communicated with each other. The volume of the containing chamber 213a on the side of the ink feed port 187 is larger than that of the containing chamber 213b backward from the ink feed port 187. It is preferable that the volume of the containing chamber 213b is smaller than a half of the volume of the containing chamber 213a.

**Please amend the paragraph that runs from page 33, line 28 to page 34, line 10 as follows:**

In an ink cartridge 220A, when ink is fed from a check valve 228, a second containing chamber 225b with an ~~actuator 225b~~-actuator 106 mounted may not be charged with ink fully due to a capillary path 227. Further, even if ink is charged from an ink feed port 230, it is difficult to charge a first containing chamber 225a with ink fully due to the capillary force of the capillary path 227. Further, it is more difficult to charge the cavity 162 of the actuator 106 mounted to the containing chamber 225b with ink without leaving air bubbles there. In this case, when the ink charging device and the ink charging method shown in Figs. 5 to 8 are used, the containing chambers 225a and 225b and the cavity 162 of the actuator 106 mounted to the containing chamber 225b can be easily charged with ink. For example, when the ink charging device shown in Fig. 5 is used, firstly, the ink cartridge 220A is installed in the vacuum container



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14. Next, the check valve 228 is closed and air is sucked from the ink feed port 230 by the vacuum pump 10 so as to decompress the ink cartridge 220A. Next, to charge the ink cartridge 220A with ink, ink may be charged from the ink feed port 230 or ink may be charged from the check valve 228 after closing the ink feed port 230.

**Please amend the first full paragraph on page 34 as follows:**

In an ink cartridge 220B, when ink is fed from an opening 250 formed in the upper part of the ink feed chamber 225a, the second containing chamber 225b with the ~~actuator 225b~~ actuator 106 mounted may not be charged with ink fully due to a porous member 242 and the capillary path 227. Further, even if ink is charged from the ink feed port 230, it is difficult to charge the first containing chamber 225a with ink fully due to the porous member 242 and the capillary force of the capillary path 227. Further, it is more difficult to charge the cavity 162 of the actuator 106 mounted to the containing chamber 225b with ink without leaving air bubbles. In this case, when the ink charging device and the ink charging method shown in Figs. 5 to 8 are used, the containing chambers 225a and 225b and the cavity 162 of the actuator 106 mounted to the containing chamber 225b can be easily charged with ink. For example, when the ink charging device shown in Fig. 5 is used, firstly, the ink cartridge 220B is installed in the vacuum container 14. Next, the ink feed port 230 is closed and air is sucked from the opening 250 formed in the upper part of the containing chamber 225a by the vacuum pump 10 so as to decompress the ink cartridge 220B. Next, to charge the ink cartridge 220B with ink, ink may be charged from the ink feed port 230 or ink may be charged from the opening 250 after closing the ink feed port 230.

**Please amend the third full paragraph on page 40 as follows:**

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Fig. 17A is a drawing showing a comparison example. The through hole 1c and the cavity 162 are not inkphobic, so that ink drops adhere to the actuator 106 and the through hole 1c and stay there. Therefore, there is the possibility that the actuator 106 may detect by mistake that there is ink in the ink cartridge though there is no ink in the same.

**IN THE CLAIMS:**

**The claims are amended as follows:**

14. (Amended) A liquid container comprising:

a container body; and

a piezo-electric device for detecting a consumption condition of a liquid in said container body, said piezo-electric device being provided with a cavity connecting to an inside of said container body;

wherein an internal pressure of said container body is reduced to a pressure lower than an atmospheric pressure, and

~~wherein said container body is charged with a liquid by a liquid charging method including the steps of reducing a pressure in said container body to a pressure lower than an atmospheric pressure and charging said container body with said liquid.~~

**Claims 26-37 are added as new claims.**